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direct system can hope, besides the ordinary improvements, for the perfection of some converter for direct currents; above all, for storage-batteries. If storage-batteries are successfully developed, the alternating system has nothing to offer that the direct system does not possess, while the advantages of the latter will be overwhelming. As we have already pointed out, however, a combination of the two systems would undoubtedly be best at the present moment.

ELECTRIC MOTORS FOR MINING-WORK.—Some contracts have just been completed by the Sprague Electric Motor Company that are being watched with interest by mine-owners. The most important order is for motors to be used on a circuit of about eighteen miles in length, for pumping, hoisting, etc. The river whose bed it is desired to work for gold, curves in a horseshoe shape; and a tunnel has been cut across the narrow part of the shoe, diverting the river from its bed. A turbine in the tunnel drives the generating-dynamo, while the motors are distributed along the bed of the river. Some of the other contracts are for running hoisting apparatus by motors, the power being obtained from streams distant two or three miles. There is no application of electricity with a wider field than the distribution of power, and nowhere can power be more successfully distributed by electricity than in mining-work.

FARBARKY AND SCHENCK ACCUMULATORS.—Among the numerous modifications of the Faure-Sellon-Volckmar accumulators, one of the most successful is the battery designed by Farbarky and Schenck. Originally the usual 'grid' form of support plate was used, the improvement consisting in mixing coke or other porous substance with the active material to give a better circulation of the electrolyte in the plate. Recently a change has been made in the shape of the holes in which the active material is contained. With the square hole completely filled with peroxide, there is no allowance made for its slow expansion, and the result is the 'growing' of the positive plate, with, under certain conditions, a falling-out of the plugs. In the new Farbarky-Schenck plate the solid bars are circular in form, intersecting, and leaving between the larger openings smaller, narrow slits, that allow the peroxide in the main openings to expand without causing more than a slight local strain. While it seems possible that this form of plate is an improvement on the ordinary type, yet it is hard to believe that plates made by pasting red lead or litharge into holes in lead frames can form the final type of storage-cell. In England, Germany, Austria, and this country, the Faure plan of using salts of lead mechanically applied to the support is almost universally used. In France, on the other hand, some modification of the Planté plate is usually employed, the endeavor being to form active coatings on the lead supports by the employment of an electric current, either forming the peroxide from the material of the support, or depositing it from the solution employed. At present the Faure plan is most generally used, but it is probable that the final lead storage-cell will be made by some modification of the Planté system.

THE SCHANSCHIEFF PRIMARY BATTERY.—This battery has zinc and carbon electrodes in a solution of basic sulphate of mercury and bisulphate of mercury in water. The cell has been tested by Sir W. Thomson, Mr. Preece, and others, and has been highly commended by them. The liquid can be quickly renewed when exhausted; the expense is not great; and for certain classes of work, such as mine-lamps, the lighting of trains, etc., it is said to possess advantages in weight and economy over secondary batteries.

BOOK-REVIEWS.

The Long White Mountain; or, A Journey in Manchuria. By H. E. M. JAMES. London and New York, Longmans, Green, & Co. 8°. \$6.

WE have reported several times on the interesting journey of Messrs. James, Younghusband, and Fulford in the south-eastern portions of Manchuria. A full account of this journey has now been published. The special value of the book lies in the full and concise description of the history, the inhabitants, and the religion of the province, and particularly its administration, produce, and trade. In the southern provinces the Chinese form of administra-

tion has now almost entirely superseded the Manchu, while in the province of Kirin both Chinese civil officials and Manchu military commandants are found. In the northern provinces, where Chinese immigrants are not so numerous as in southern Manchuria, the Manchu military officers still bear sway. In the region of the Long White Mountain no officials of any kind are found, but the inhabitants have formed themselves into guilds,—a very effective means of keeping their district free from brigands, which infest almost the whole province of Manchuria. The towns and villages are protected from their ravages by walls. In discussing the taxation, the author mentions the general corruption of the authorities, and gives his opinion on the opium trade. He shows that opium is grown in many parts of Manchuria, even close by the highways, although its cultivation is prohibited by law. Therefore he thinks that the raid upon the Indian opium trade is out of place, as China can supply her want of opium herself. This chapter of the book is one of the best, as the author, who is a member of the Civil Service of India, has evidently a thorough knowledge of the trade and commerce and of the production of eastern Asia. In the description of his travels, which occupies the second half of the book, particular attention is paid to the produce of each part of the province, to the methods and facilities of trade, and to the dues collected from it. He describes the roads, which are for the most part practicable only in winter, when the swamps and bogs are frozen. Even the military roads are in a poor condition. The most interesting part of the journey was that in the Ch'ang-pai-shan, the Long White Mountain, which was known from descriptions of Chinese travellers and the Jesuits, who visited it in the beginning of last century. The mountains were said to attain a height of twelve thousand feet or more, but the measurements of Younghusband show that it is only eight thousand feet high. The sources of all important rivers of Manchuria are situated in these mountains; and it must be regretted that the travellers, on account of a scarcity of supplies, were unable to make a more accurate survey of this region. The description of the inhabitants, who have formed a small republic of their own, is very interesting. We described some of the observations made by the travellers in this region in No. 245 of *Science*, according to a lecture delivered by James before the Royal Geographical Society. In the present volume he details his experiences more fully, and his report is full of interesting facts. After leaving the Long White Mountain, the travellers turned northward, and visited Tsitsihar and many other places, their travels practically covering the whole region east of the line from the Gulf of Liao-Tung to Tsitsihar. The book, which is accompanied by a good map and numerous illustrations, forms a very valuable contribution to our knowledge of the present state of affairs in Manchuria, the author giving a vivid picture of all he has seen and heard during his interesting journey.

A Manual of Analytical Chemistry, Qualitative and Quantitative, Inorganic and Organic. By JOHN MUTER. 3d ed. Philadelphia, Blakiston. \$2.

THE object of this work has been to produce a manual, short and easily understood, taking the student from the simplest to the most complex matters of qualitative analysis, and also dealing with quantitative work sufficiently to give him a fair insight into all branches of this department. It is adapted for students who desire to prepare for pharmaceutical, medical, or general university examinations in practical chemistry. The present edition has been considerably condensed in bulk, though a large amount of additional matter has been introduced. Muter's analytical chemistry has always been a popular manual with teachers and students, and the improvements in this edition will make it still more acceptable.

The Urine. Memoranda, Chemical and Microscopical, for Laboratory Use. By J. W. HOLLAND. Philadelphia, Blakiston. 12°. 50 cents.

THIS manual deserves to be generally adopted in medical schools and by physicians. It contains the latest and best tests, and is well illustrated. In addition to the tests recommended, which are both chemical and microscopical, Dr. Holland gives, under the heading 'Import,' the bearing which the result of these tests has upon the diagnosis and treatment of the patient. For instance, after describing the various tests which may be employed for the detec-

tion of urea, he says, "As urea is highly soluble, it is never spontaneously deposited. It varies in amount with different diseased conditions: e.g., in febrile and inflammatory affections it is increased in the forming stage, and diminished in that of defervescence; in diabetes mellitus and simplex it is excessive in the urine; while in acute yellow atrophy of the liver it may be entirely absent. In acute and chronic Bright's disease there may be a decided falling-off from the healthy proportion, causing a lower specific gravity. In such cases there is more or less danger of uræmia." These clinical notes are well and concisely written, and increase the value of a book which is in all other respects excellent.

NOTES AND NEWS.

DR. EMIL BESSELS, the eminent Arctic explorer, died suddenly on Saturday, March 31, at Stuttgart. His death was reported here on Monday, but not confirmed until Wednesday. He was well known to American scientists, as he lived in Washington after his return from the 'Polaris' expedition, of which he was a member. He died while in his native country, where he was about to publish a number of works.

—The incessant endeavors of the Providence Franklin Society to organize a geographical survey of the State of Rhode Island have at last been successful. The Legislature of that State has voted a sum of five thousand dollars for a topographical survey, and appointed a commission of three to contract for and superintend the work. Prof. Winslow Upton, Mr. Mills, and David W. Hoyt were appointed commissioners.

—Th. Macfarlane, in the third 'Bulletin of the Laboratory of the Inland Revenue Department of Canada,' comments upon the adulteration of coffee in Canada. Among eighty-five samples collected in various cities of Canada, only forty-four, or fifty-two per cent, were genuine, while the rest were to a greater or less extent mixed with chicory and roasted grain and peas. Among the samples occurred some described as "chiefly roasted grain with chicory and a little coffee." As these samples were bought by revenue officers, it is probable that in reality the percentage of adulterated coffee is still greater than the above figures indicate.

—Dr. Götz Martius of the University of Bonn publishes a lecture upon the aims and results of experimental psychology, in which he makes a high claim for the admittance of this science to an acknowledged place upon the curriculum of every university. The immediate occasion of the address was to arouse an interest in this line of research among the members of the university at Bonn, and to urge the establishment of a laboratory where Professor Lipps, the well-known psychologist, and himself, can have the opportunity of contributing to the advance of this growing science. There are several indications that the leading educational institutions of this country will advocate a similar department in the near future.

—The Imperial Observatory of Rio de Janeiro plans the publication of a universal dictionary of climatology. For this purpose, the director, Mr. L. Cruls, has prepared and sent out a circular soliciting information from all official and private sources as to the climatic elements of places at which observations have been or are being carried on. A table is attached to the circular, in which the results of observations are to be inserted. The mean temperatures of the months of the year, the mean maxima and minima, humidity, days and amount of precipitation, cloudiness, frequency of gales, days of frost, prevailing winds, the absolute maxima and minima, the mean annual barometric pressure, and the mean annual oscillation of the latter, are the points on which information is solicited.

—Last summer Prof. B. W. Evermann of the State Normal School, Terre Haute, and Prof. O. P. Jenkins of De Pauw University, spent their vacation at Guyamas, Mex., on the Gulf of California, collecting fishes. They packed their specimens and shipped them for home, but they did not arrive until recently, having been lost somewhere. Professors Evermann and Jenkins will arrange the collection this summer, and prepare the results of their work for publication.

—In *Science* for March 9, p. 119, 1st column, 5th line from bottom, for 'homogeneous' read 'homonymous,' for 'image' read 'images,' and for 'it' read 'they.'

LETTERS TO THE EDITOR.

Dr. Edward Tyson and the Doctrine of Descent.

ONE of the things most strongly emphasized by the recent publication of Charles Darwin's letters is his conscientious recognition of the claims of others to the first discovery of either the law of descent with variation or the principle of natural selection. The pains he took to prefix to the later editions of his work on the origin of species an historical sketch, is evidence of his earnest desire to do full justice to all previous explorers in his field. He, however, did not consider it incumbent on him to look beyond the narrow circle of those who had distinctly and explicitly expounded a doctrine of derivation. Nevertheless, for the future historian of scientific belief, the mere foreshadowings and beginnings of the modern idea of the origin of species, which Darwin set upon a firm basis of inductive proof, cannot but have an enduring interest and importance.

In this view of the matter, I feel that I may perhaps claim space in your journal to call attention to the work and writings of a man who does not seem to have been mentioned heretofore in connection with this subject, but who undoubtedly had at least a vague presentiment of the coming theory of the descent of man, derived from anatomical investigations, which, even at the present time, would probably be regarded as skilful and exact. I refer to Dr. Edward Tyson, fellow of the Royal Society and of the College of Physicians, and otherwise distinguished in his day as a man of learning and ability, who published, in 1699, his treatise entitled '*Orang-Outang, sive Homo Sylvestris; or the Anatomy of a Pygmy compared with that of a Monkey, an Ape, and a Man.*'

It is pleasing to observe in this book not only the carefulness with which Dr. Tyson traced the differences and resemblances between the parts and organs of the little monkey brought to him from Africa and the homologous parts in the higher primates, particularly man, but also the ingenuity and insight with which he drew inferences, which, if freed from the repressing influences of the seventeenth century, we can hardly doubt would have extended to the clear discernment and acceptance of the general law of development. The details of his anatomical comparisons there is not room for here; but some of his theoretical views may, I think, be referred to without exceeding proper limits.

In the first place, he seems to have perceived, though dimly, the main basis of evolution; for, amongst other similar reflections, he says, "I find there are intermediate *Species of Beings* between *Vegetables* and *Animals*, as the *Zoophyta*; the *History* of which I could extremely desire might be given us; and can but think that regularly in compiling a *History of Animals*, one should commence from them; and amongst these, no doubt, but that there are several degrees of Perfection, till we come to what might be properly called an *Animal*." And in another place, with still more particularity, he tells us, "Tis a true Remark, which we cannot make without Admiration; That from Minerals to Plants; from Plants to Animals; and from Animals to Men; the Transition is so gradual, that there appears a very great Similitude, as well between the meanest Plant, and some Minerals; as between the lowest Rank of Men, and the highest kind of Animals. The Animal of which I have given the Anatomy, coming nearest to Mankind; seems the Nexus of the Animal and Rational."

As if it were not enough to thus skirt along the edge of the doctrine of derivation, our author appears to have actually had a prophetic eye upon the great leader in the scientific renaissance of the nineteenth century, when he exclaims that "it would be the Perfection of Natural History, could it be attained, to enumerate and remark all the different *Species*, and their *Gradual Perfections* from one to another." And with the same irresistible impulse which Darwin possessed, to philosophize as well as observe, he further on explains with reference to his own comparative survey of his pygmy with a monkey, an ape, and a man, that, "by viewing the same Parts of all these together, we may the better observe *Nature's Gradation* in the Formation of *Animal Bodies*, and the Transitions made from one to another."

It is interesting to observe, also, that Dr. Tyson not only anticipated, in a measure, the methods and conclusions of the Darwinian period, but even, in some cases, made use of the very terms and